



Department of Energy

ROCKY FLATS FIELD OFFICE
P.O. BOX 928
GOLDEN, COLORADO 80402-0928

NOV 03 1994

94-DOE-10839

Ms. Nancy Dayton
Boulder County Parks and Open Space
P.O. Box 471
Boulder, CO 80306

RE: REPORT ON ANALYSIS OF YOUR SOIL SAMPLE - LOCATION PT 13092

Dear Ms. Dayton:

The Department of Energy (DOE) first wishes to thank you for allowing access to Boulder County Parks and Open Space property for soil sampling. Your cooperation is greatly appreciated and essential to this important environmental investigation.

Second, the DOE has received initial data from the soil samples taken from the property as part of the ongoing Rocky Flats Plant environmental investigation. **The surface soil concentration level from your property falls within the measured local background concentration range.**

Included in this correspondence are your laboratory analysis results (Enclosure 1), results of soil analyses from background locations for comparison (Enclosure 2), and an information sheet defining technical terms used in the explanation of the data (Enclosure 3). Also included is information on types and sources of radiation (Enclosure 4A and 4B).

Your soil analysis results represent the concentration of certain radioactive materials - plutonium, americium, and uranium - found in surface soils. Plutonium is primarily a result of artificial production; little naturally-occurring plutonium exists in the world. However, small amounts are found in soils throughout the world as a result of residual fallout from past global atmospheric nuclear weapons testing and space research. No nuclear weapons tests have ever been conducted at Rocky Flats. In addition to plutonium, smaller amounts of americium are found in association with plutonium. Americium is formed from the decay of plutonium and is an important component of fallout. Uranium is a naturally-occurring radioactive material found at varying concentrations throughout the United States. The Front Range of Colorado typically has relatively high and variable natural uranium in its soil compared with much of the rest of the United States. Thus all soils contain measurable amounts of background levels of plutonium, americium, and uranium from fallout and natural sources.

In addition to natural background levels and fallout sources of plutonium, americium, and uranium, the Rocky Flats Plant has used these materials in the plant's past operations. Although sample results are reported for plutonium, americium, and uranium; plutonium is considered the most important contaminant of concern in areas offsite of Rocky Flats. One purpose of the environmental investigation is to determine what range of concentrations of plutonium, americium, and uranium can be expected in this geographic area from background sources and what amounts, if any, of these materials in soil might be attributed to past Rocky Flats activities. We greatly appreciate your assistance in helping us develop this information.

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1/3

NOV 03 1994

The analysis of soil samples from your property include measurements of the radioactivity from three elements: plutonium (Pu), americium (Am), and uranium (U). The forms or "isotopes" of the elements include $^{239/240}\text{Pu}$, ^{241}Am , $^{233/234}\text{U}$, ^{235}U , and ^{238}U . The superscript number preceding the element symbol describes the total number of protons and neutrons in the nucleus of the element atom and indicates the isotope of the element. These are the primary isotopes contributing to background radioactivity and Rocky Flats Plant sources of plutonium, americium, and uranium.

Two different sampling methodologies were used to sample your property. Both methodologies sampled the top surface of the soil but at slightly different depths. The Colorado Department of Health (CDH) method samples the top 1/4 inch of soil. The Rocky Flats Plant (RFP) method samples the top 2 inches of soil. Results from both methods are reported in enclosure 1. When results from the two sampling methods are statistically compared, no difference is found. We are reporting results for both methods for completeness. Soil sample results are expressed in units of picocuries per gram of soil (pCi/g). A curie is a unit for measuring radioactivity based on the rate of radioactive disintegration. Approximately sixteen grams of plutonium will produce 1 curie of radioactive disintegration. A picocurie is a fraction of a curie equal to one-trillionth of a curie.

You will notice in Enclosure 2 that the background concentrations of these radionuclides are highly variable. Deposition of radioactive fallout is not uniform, therefore the concentration found in soils is also not uniform. Large variations in concentration can occur even within a small geographic area. Fallout deposition is greatly influenced by the weather, particularly rain and snow distribution and wind patterns. Thus fallout levels increase with altitude, most likely because of higher precipitation. These factors make assessing possible offsite impacts, in the low background concentration range, from the Rocky Flats operation very difficult.

To understand the analysis results from your property, comparison with existing background concentrations is valuable. Enclosure 2 reports background levels for Pu, Am, and U. Two sources of background results are listed: measurements by DOE from an area northwest of the Rocky Flats Plant and measurements by the Colorado Department of Health obtained from eastern Colorado. The Colorado Department of Health uranium analysis only measured the total uranium metal content, or sum of the isotopes, in the soil rather than specific isotopes reported in DOE's background measurements. Plutonium is our primary contaminant of concern in the areas offsite from Rocky Flats. The soil concentration level from your property falls within the expected local background concentration range of 0.007 - 0.100 pCi/g of $^{239/240}\text{Pu}$.

Your surface soil sample results will be combined with other soil, sediment, air, surface water, groundwater, and biological sample analysis results to assess the effect of Rocky Flats on offsite areas. A Remedial Investigation Report is in development to determine the nature and extent of offsite contamination and assess the potential human health risk. A draft report will be prepared by the middle of next year but will require extensive review cycles by the Environmental Protection Agency and Colorado Department of Health before final approval.

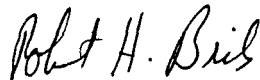
Ms. Nancy Dayton
94-DOE-10839

3

NOV 03 1994

Please review the enclosed information. If you should have any questions at all, please call me, Robert Birk at 966-5921. I will make whatever arrangements are necessary to answer your questions or concerns. Again, we extend our appreciation for your assistance in this project.

Sincerely,



Robert H. Birk
Operable Unit 3 Program Manager
Environmental Restoration

Enclosure

cc w/Enclosure:
S. Schiesswohl, PIMD, RFFO
M. Roy, OCC, RFFO
M. Buddy, EG&G

cc w/o Enclosure:
B. Brainard-Jordan, CED, RFFO
S. Stiger, EG&G